OIPE JC
JUL 23 2004
PATENT & TRADEMARK OFFICE

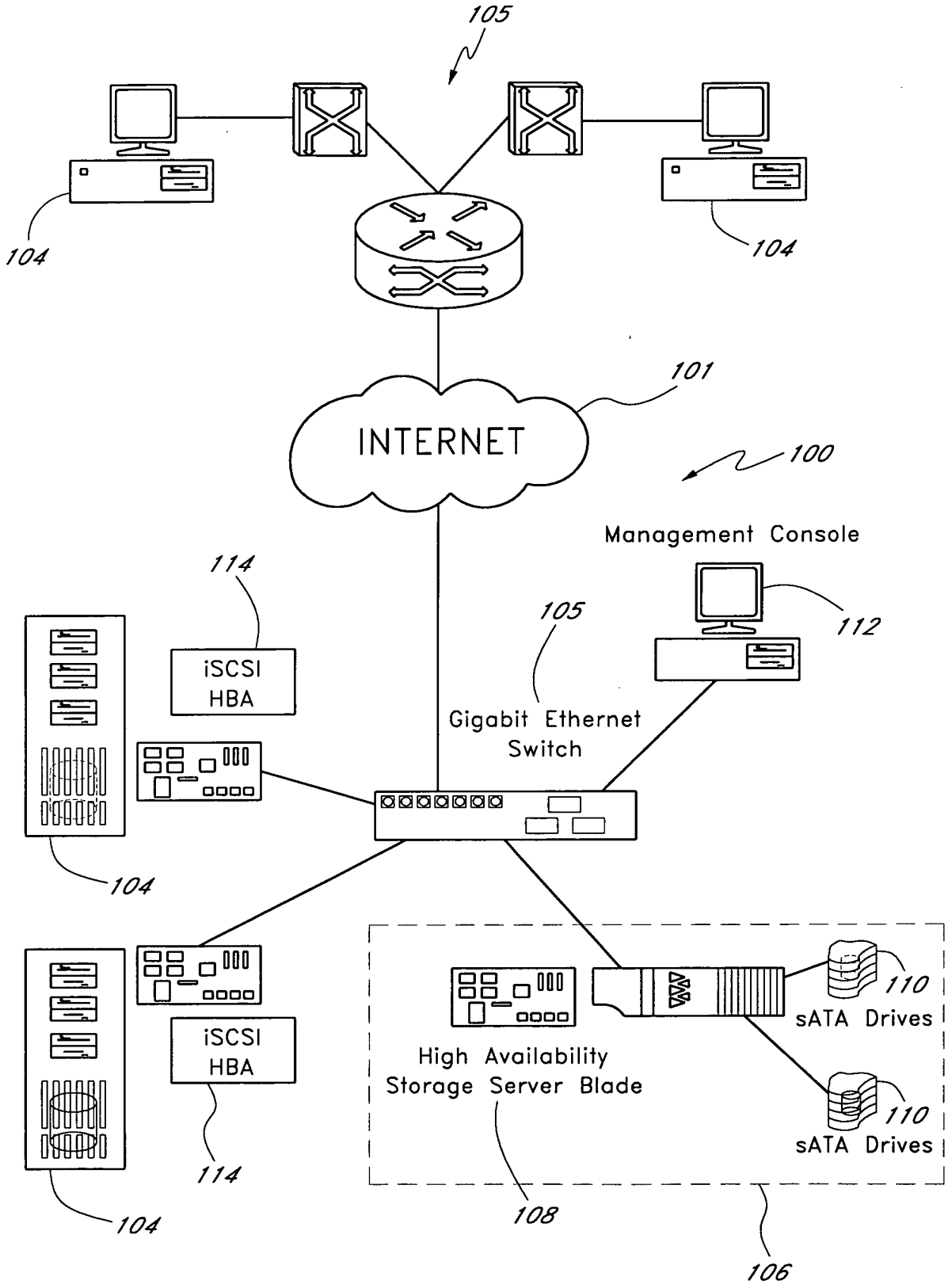

FIG. 1

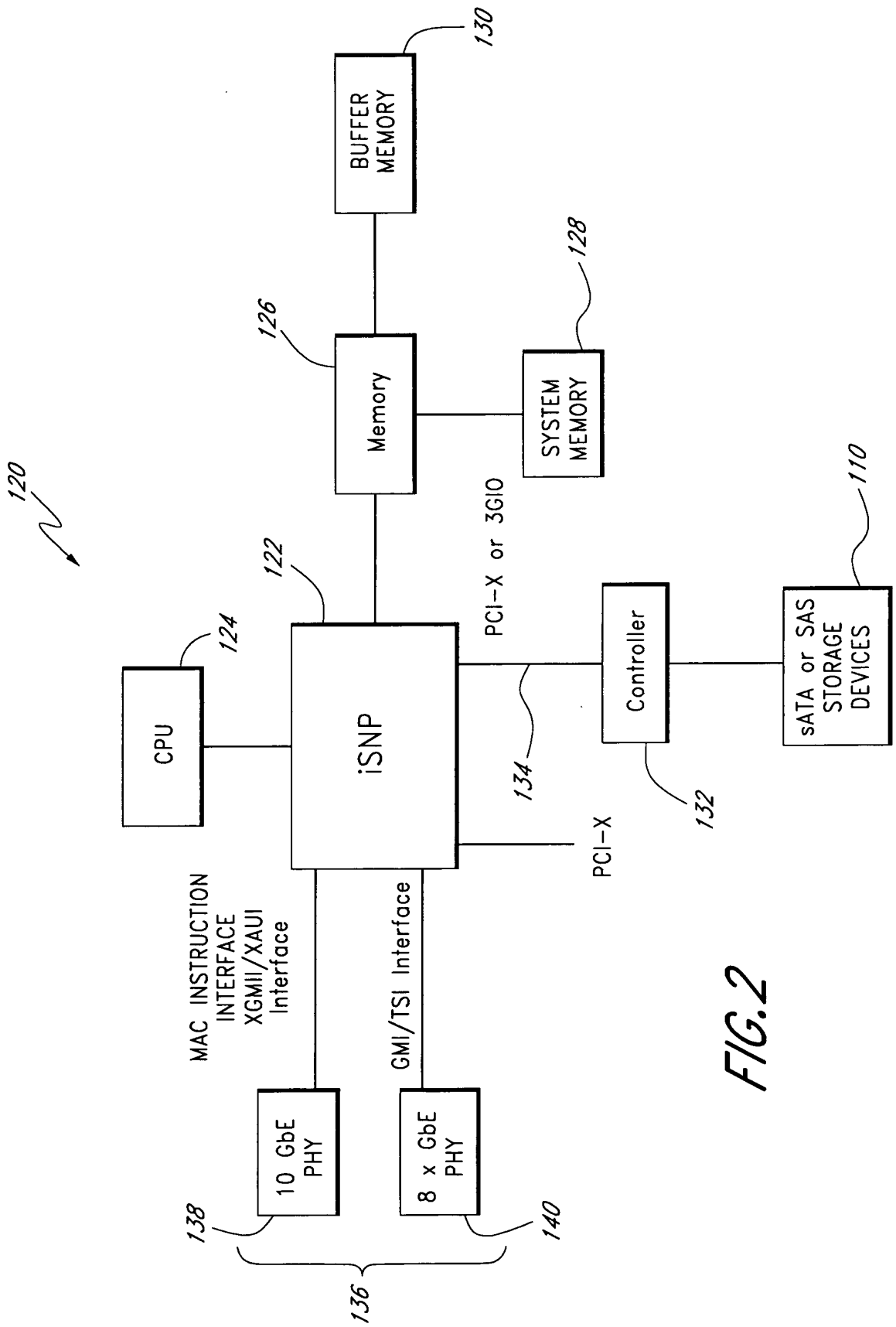
120
BUFFER MEMORY
130
Memory
126
SYSTEM MEMORY
128
PCI-X or 3GIO
122
CPU
124
iSNP
Controller
110
sATA or SAS STORAGE DEVICES
134
132
PCI-X
MAC INSTRUCTION INTERFACE XGMII/XAUI Interface
GMI/TSI Interface
10 GbE PHY
8 x GbE PHY
138
140
136

FIG.2

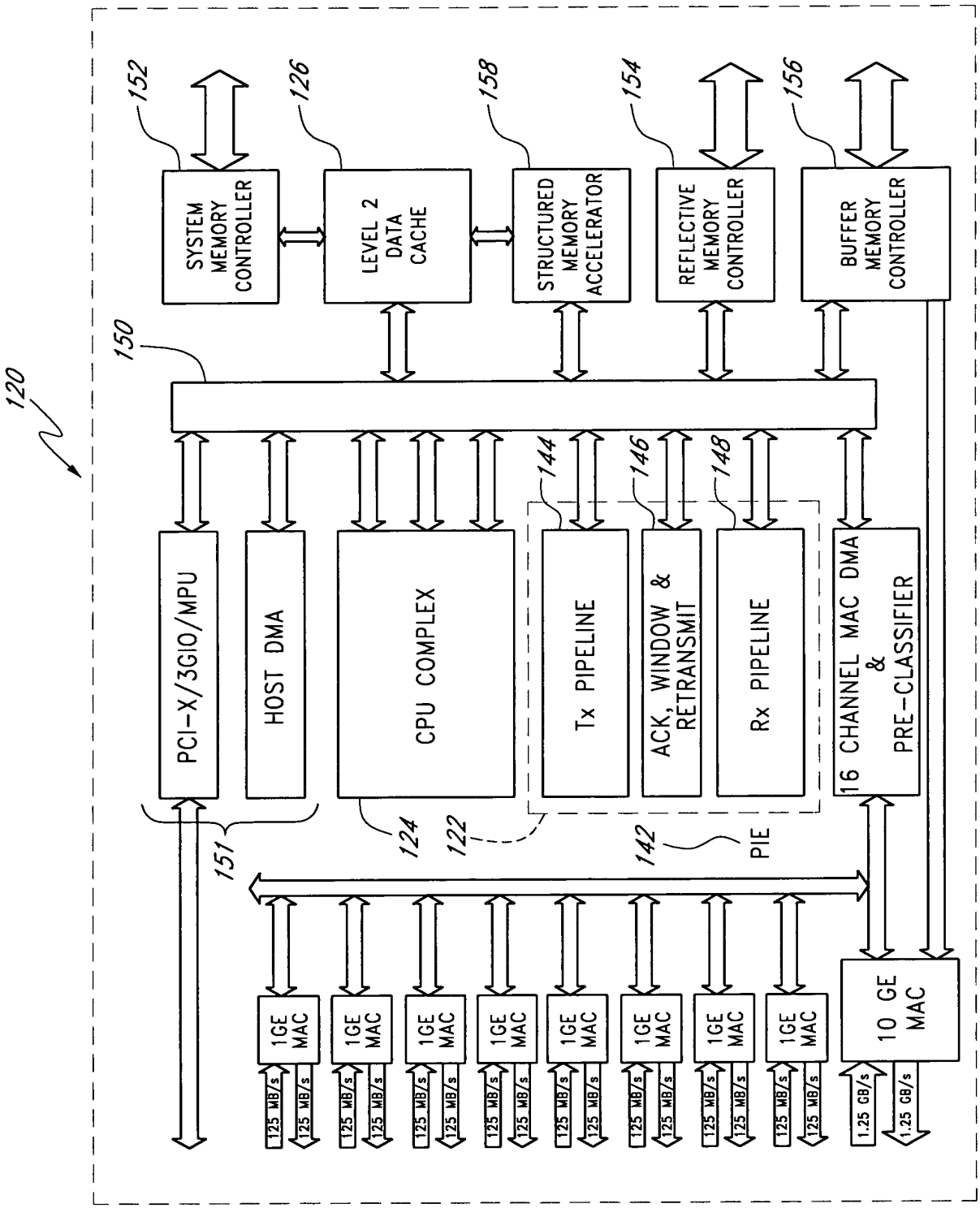
120
150
152
126
158
154
156
SYSTEM MEMORY CONTROLLER
LEVEL 2 DATA CACHE
STRUCTURED MEMORY ACCELERATOR
REFLECTIVE MEMORY CONTROLLER
BUFFER MEMORY CONTROLLER
144
146
148
PCI-X/3GIO/MPU
HOST DMA
CPU COMPLEX
Tx PIPELINE
ACK, WINDOW & RETRANSMIT
Rx PIPELINE
16 CHANNEL MAC DMA & PRE-CLASSIFIER
124
122
142
PIE
151
1GE MAC
10 GE MAC
125 MB/s
1.25 GB/s

FIG. 3

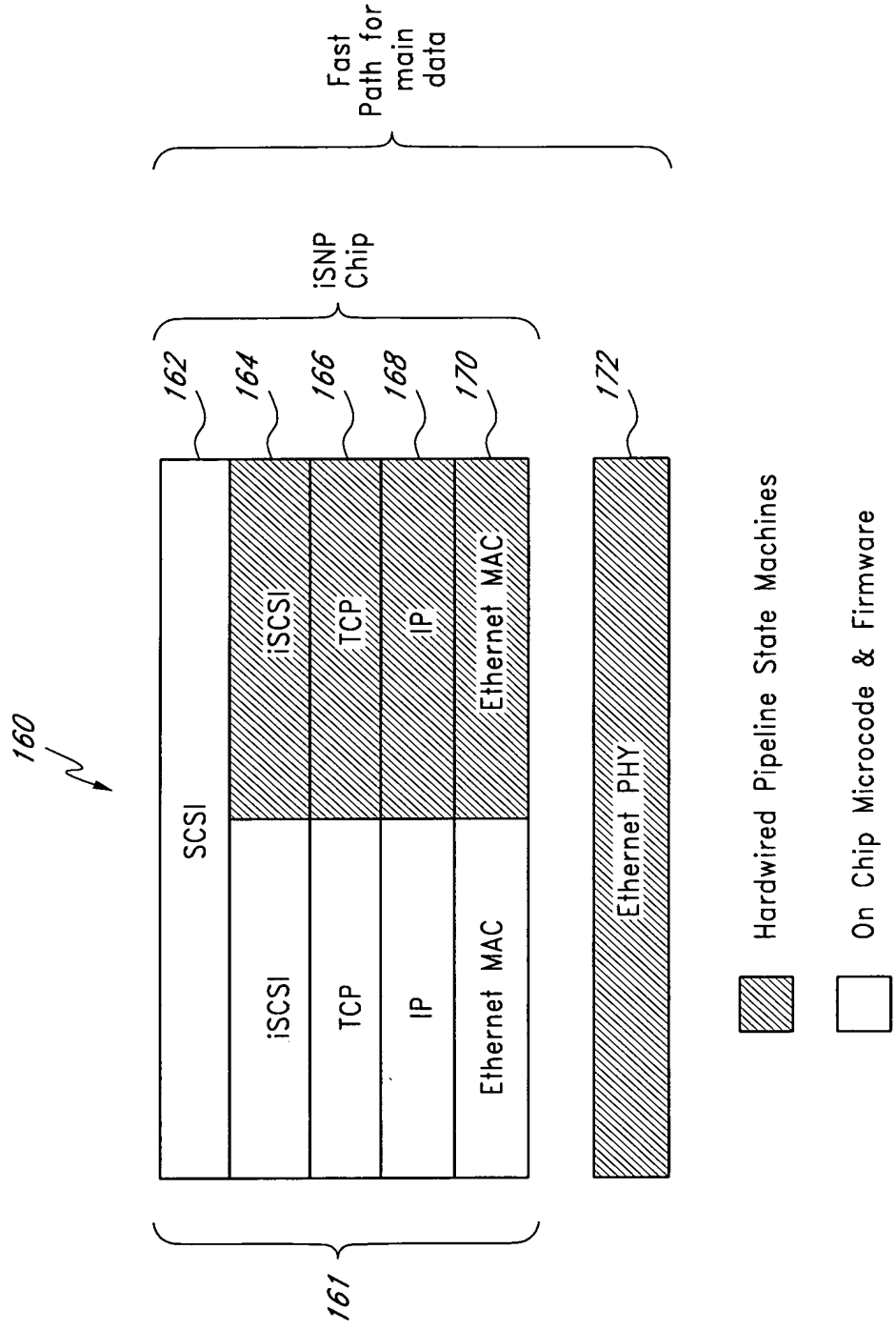
Fast Path for main data
iSNP Chip
162
164
166
168
170
172
160
SCSI
iSCSI
TCP
IP
Ethernet MAC
iSCSI
TCP
IP
Ethernet MAC
Ethernet PHY
161
Hardwired Pipeline State Machines
On Chip Microcode & Firmware

FIG. 4

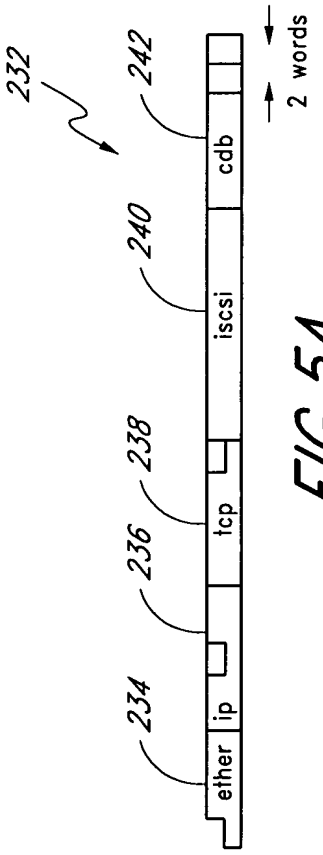

FIG. 5A

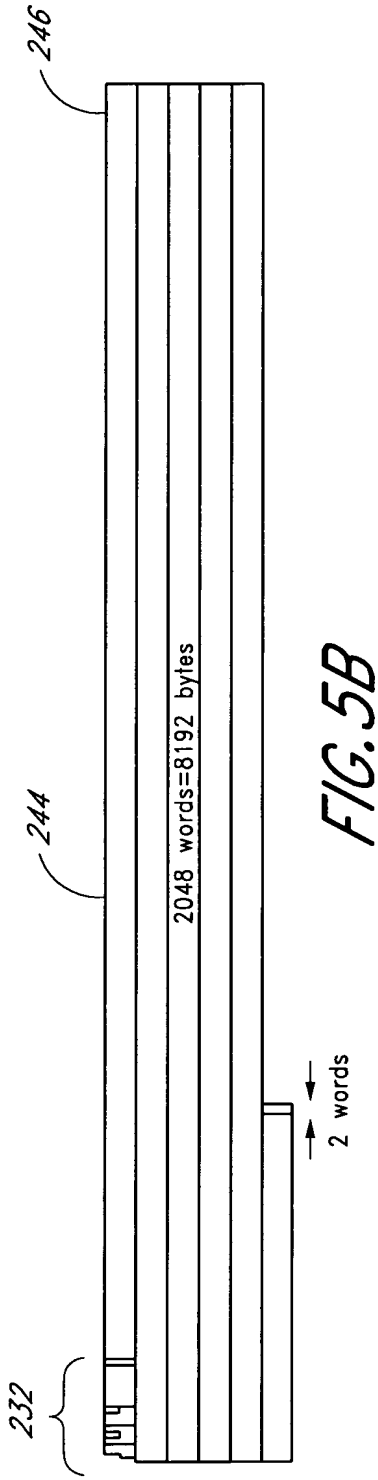

FIG. 5B

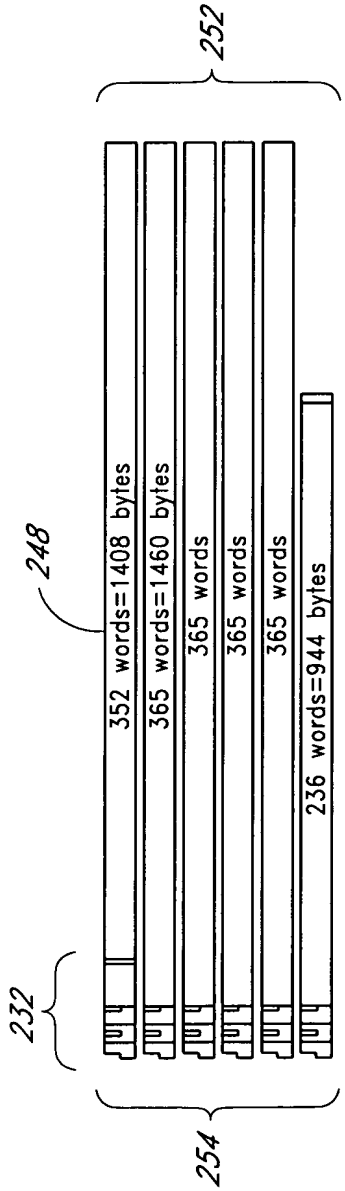

FIG. 5C

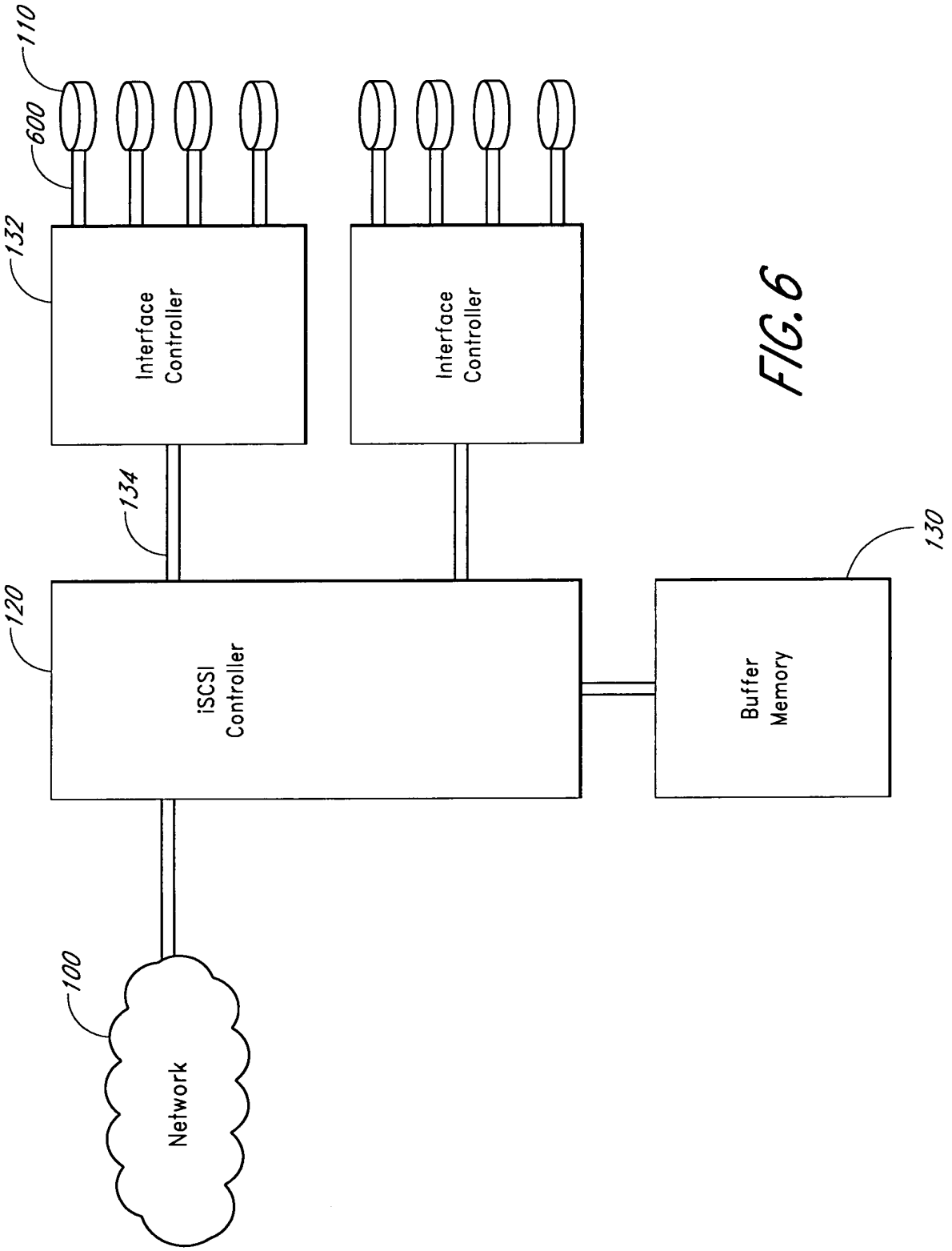
110
600
132
Interface Controller
Interface Controller
134
120
iSCSI Controller
Buffer Memory
130
100
Network

FIG. 6

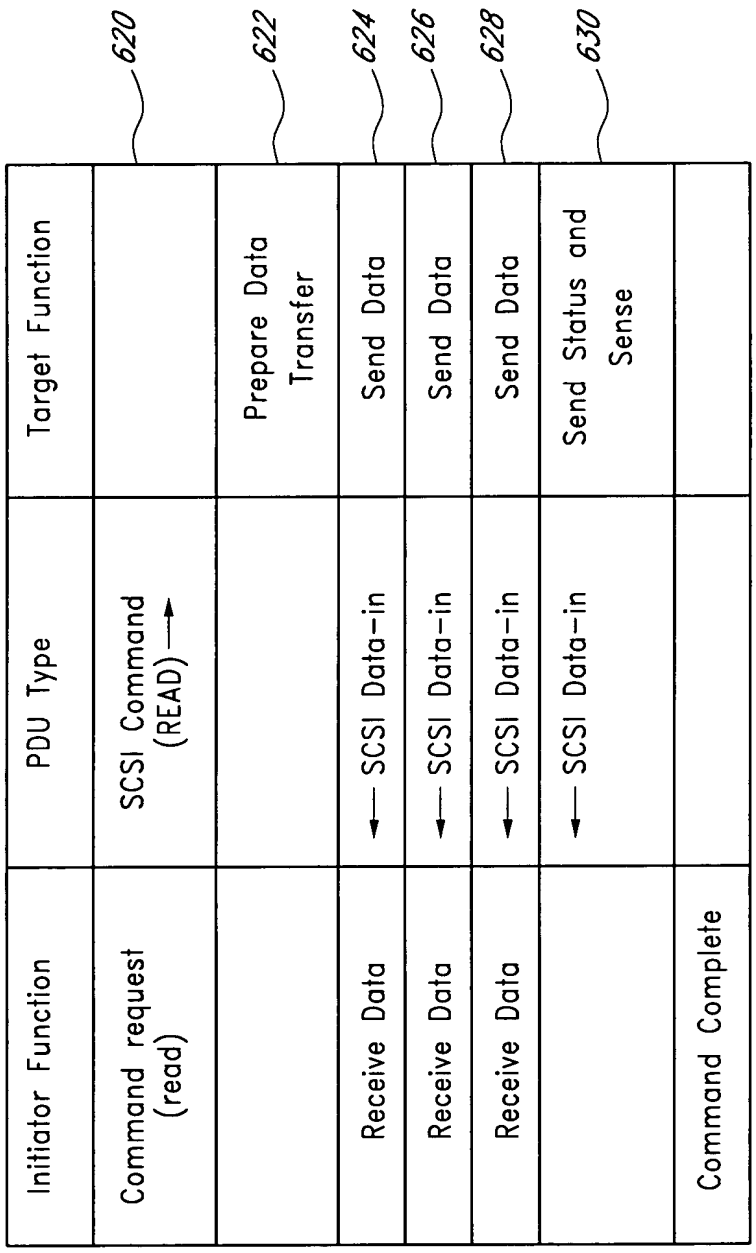
620
622
624
626
628
630
Initiator Function
PDU Type
Target Function
Command request (read)
SCSI Command (READ) →
Prepare Data Transfer
Receive Data
← SCSI Data-in
Send Data
Receive Data
← SCSI Data-in
Send Data
Receive Data
← SCSI Data-in
Send Data
← SCSI Data-in
Send Status and Sense
Command Complete

FIG. 7

640
642
644
646
648
650
652
654
656
Initiator Function
PDU Type
Target Function
Command request (write)
SCSI Command (WRITE)→
Receive command and queue it
Process old commands
← R2T
Ready for data
Send Data
SCSI Data-out→
Receive Data
← R2T
Ready for data
Send Data
SCSI Data-out→
Receive Data
← R2T
Ready for data
Send Data
SCSI Data-out→
Receive Data
Send Data
SCSI Data-out→
Receive Data
←SCSI Response
Send Status and Sense
Command Complete

FIG.8

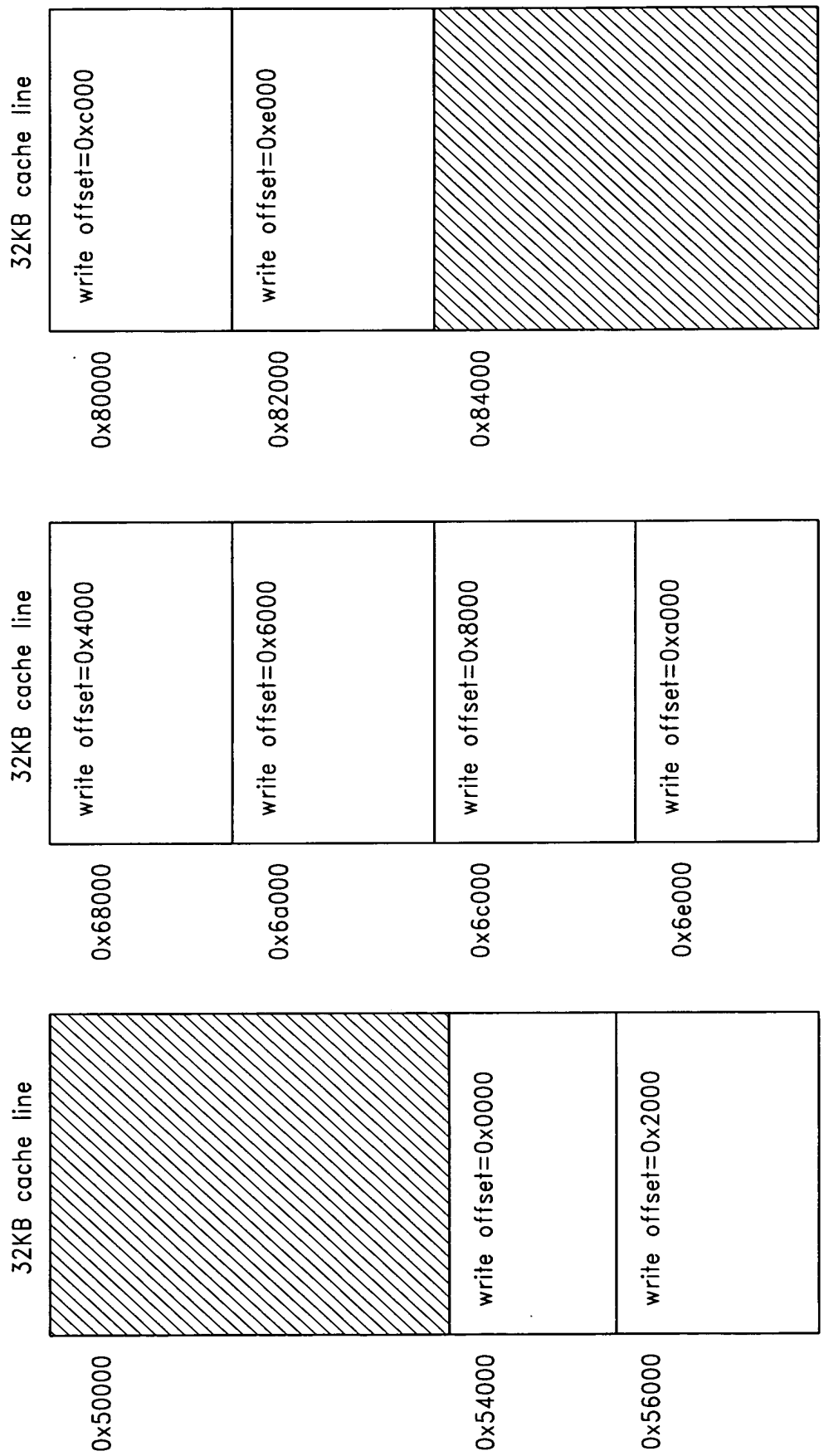
32KB cache line
write offset=0xc000
write offset=0xe000
0x80000
0x82000
0x84000
32KB cache line
write offset=0x4000
write offset=0x6000
write offset=0x8000
write offset=0xa000
0x68000
0x6a000
0x6c000
0x6e000
32KB cache line
write offset=0x0000
write offset=0x2000
0x50000
0x54000
0x56000

FIG. 9A

R2T PDUs sent to initiator:

	Target Transfer Tag	offset	length
1	0x0010_0123	0x0000_0000	0x0000_4000
2	0x0011_0123	0x0000_4000	0x0000_8000
3	0x0012_0123	0x0000_c000	0x0000_4000

FIG. 9B

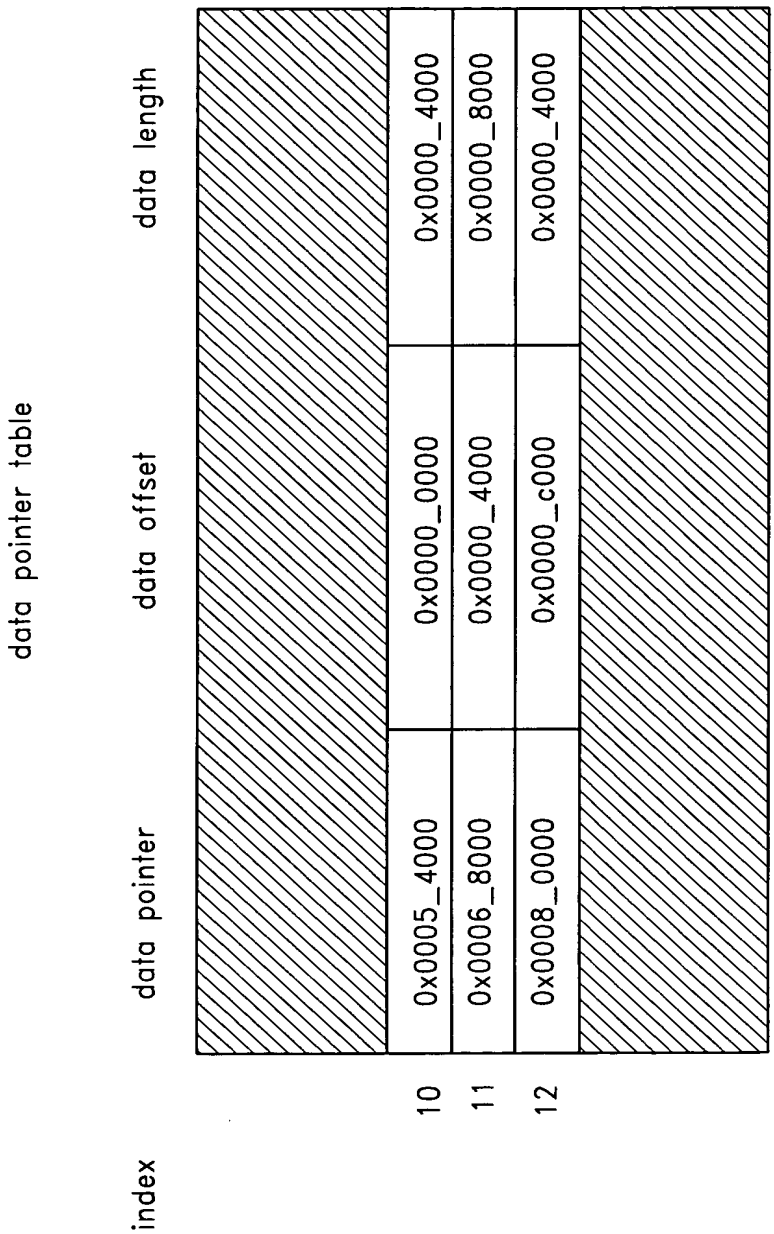
data pointer table
index
data pointer
data offset
data length
10
11
12
0x0005_4000
0x0006_8000
0x0008_0000
0x0000_0000
0x0000_4000
0x0000_c000
0x0000_4000
0x0000_8000
0x0000_4000

FIG. 9C

data out PDUs received from initiator:

pdu#	Target Transfer Tag	offset	length
1	0x0010_0123	0x0000_0000	0x0000_2000
2	0x0010_0123	0x0000_2000	0x0000_2000
3	0x0011_0123	0x0000_4000	0x0000_2000
4	0x0011_0123	0x0000_6000	0x0000_2000
5	0x0011_0123	0x0000_8000	0x0000_2000
6	0x0011_0123	0x0000_a000	0x0000_2000
7	0x0012_0123	0x0000_c000	0x0000_2000
8	0x0012_0123	0x0000_e000	0x0000_2000

FIG. 9D